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THE IMPLEMENTATION OF  
EXECUTIVE SUPPORT SYSTEMS

ELIOT LEVINSON

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CISR WP #119  
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## INTRODUCTION

Paul Dawson is President of Wellness, Inc., a health care distribution company. When Dawson took over the division 2 years ago, it was wracked by problems, losing market share, and its veteran sales force was not producing results. The firm was headed for its first loss in a decade. During the past year Dawson and his associates have utilized a computer based executive information system to analyze their markets, reorganize their sales approach, restructure and sell off a part of a manufacturing unit, and change their product mix. Use of this tool has been instrumental in the turnaround of Wellness into a profitable company. In the process, Dawson has changed the culture of Wellness from a traditional sales organization to an analysis-oriented marketing organization. He has also restructured the organization to better fit the new direction. Employees of Wellness see the changes as a dramatic culture shift.

John Pepper is one of 18 group executives of a very large manufacturing firm. For the last 12 months Pepper has had a personal computer on his desk and one in his home. The personal computer is linked to several corporate data bases, has word processing and electronic mail, Pepper's stock portfolio, spread sheets, calendaring, document transfer capabilities, and allows him access to external data bases and news services. Mr. Pepper has his secretary check the electronic mail and uses the personal computer to analyze his stock portfolio, but he is not using his support system to any large degree.

John Pepper and Paul Dawson both have executive support systems (ESS): terminal-based computer systems designed to aid senior executives in the management of the firm. The use of information technology at the top of the firm warrants study to provide insight into how the technology is changing the practice of management, as well as the processes and procedures in the firm.

The executives who sponsored the ESSs in this study view them as being of two types:

- 1) executive office automation focusing on efficiency, emphasizing personal management and communication tools, or as
- 2) business oriented systems focusing on effectiveness, emphasizing decision support tools based on a business problem.

The purpose of this paper is to describe these two types of ESS and to discuss the five key elements most affective of the development and utilization of ESS. Their interactive effects are not fully explicated in this discussion; rather, it allows for a clear understanding of the building blocks of executive support.

## FRAMEWORK

The framework for this study attempts to explain the degree of usefulness executive support systems ultimately provide to their users. There are two components to the framework:

- o The key elements component identifies those features of the ESS which distinguish successful from unsuccessful implementation efforts.

These key elements were derived from observation of ESS in the firms we studied.

- o The time framework addresses the stages of implementation.

The stage framework, combined with the key elements, allows determination of the importance of individual elements at different stages of implementation. The stage theory was developed and utilized by the Rand Corporation in the evaluation of technological innovations (Bikson, 1981). It is based on the premise that the utility of innovation is discovered and invented as it is utilized.

New technologies are never implemented as planned. To achieve successful implementation, both the technology and the organization must change and adapt to each other. To understand the implementation of ESS, a framework of the implementation process and of the components of executive support is helpful.

The five key elements that impact the effectiveness of ESS are:

- 1) the presence of a business problem or vision used to define the purpose of the system;
- 2) titular sponsorship by a senior executive and managerial sponsorship by his delegate;
- 3) the organization of Management Information Systems (MIS) computing groups as effective support organizations that translate managerial needs into technical systems;
- 4) the existence of a well-defined, accessible database;
- 5) the effective management of resistance that occurs as the new systems change established procedures and reporting relationships.

These key elements are of varying importance at different stages of development and implementation of the system.

Figure 1, the matrix of key elements of executive support at different stages of development, provides the framework for understanding what is essential to the successful implementation of an ESS.

Figure 1

	Business Problem	Sponsorship	Computing Groups	Database	Mgmt. of Resistance
Organization	High	High	High	High	Low
Installation	Low	High	High	Low	High
Institution	Low	Low	High	High	Low

The implementation process is divided into a life cycle of 3 phases: organization, installation; and institutionalization.

The organization phase occurs before the ESS is implemented. The task in this period is to define the problem being solved, form the coalition of people necessary to undertake the project, determine what information is needed, and develop a sense of what the support will accomplish.

The installation phase is the actual undertaking of the project. During this period there are usually 1) technical problems, 2) organizational resistance issues that arise around unexpected startup problems and changes in procedures, and 3) adjustments needed to augment or decrease the scope of the system. There can be several iterations of a support system and changes in participation in it as it evolves. At the end of the installation period a decision is made to continue the use of the support system or to cease it's

use, either because it did not fulfill its initial purpose, or the purpose, while met, did not provide the assistance originally anticipated.

The institutionalization phase is the period in which the system becomes incorporated as an ongoing part of organizational procedures. Institutionalization can occur in several ways: use of the system by successors to the original executive, diffusion of the system to other executives, and/or by changes in the work of subordinates and the structure and processes of the organization.

This implementation framework allows us to study executive support from its inception, through development to full usage. Concomitantly, it provides an aid to understanding when and why ESSs do or do not work as planned, are institutionalized, or are discarded.

## METHODOLOGY

The research for this study comes from two sources: 1) in-depth case studies documenting the implementation of executive support systems in five firms over a two year period; and 2) the regular monitoring of executive support activity in 20 firms. The majority of the systems were studied from planning phase through implementation.

Longitudinal studies were undertaken because it was presumed that usefulness of the support systems would be determined during their implementation since planners, users, and those affected by the system had no previous experience with the innovation. It was also felt that different problems and processes would occur at various stages in the implementation process: specifically that the issues involved in the organization stage (pre-implementation) installation stage, and institutionalization (post-implementation) would be different and could modify the initial design of the support system.

The case study utilized interviews conducted on a regular basis in each of the five firms, with senior executives, MIS personnel and managers, and analysts who were affected by the system. In addition, records of all events which reflected the resource allocation, planning, execution and use of the system were used with the interviews.

Third, a systematic tracking of decisions involved in the implementation of the support system was developed for each firm in order to facilitate comparison of the systems and to isolate the key factors that affected successful or problematic implementation of the system.

The contract with the other 15 firms consisted of three meetings per year with managers and MIS directors responsible for executive support systems and the ongoing monitoring of these systems.

Following is a description of the five firms (names are disguised):

Manuco is a multinational manufacturing organization with stable leadership.

Manuco has been affected severely in recent years by foreign competition and the need to modernize production processes. Executive support was called for by the chairman who felt that every group head should demonstrate the use of technology as an example for their organizations. Responsibility for development and execution of the support system was given to the MIS organization. The system consisted of a pilot program involving 18 executives and their secretaries, who were provided with various word processing, spread sheet and communication tools. At the end of one year, the pilot program was ended and some of the executives returned their terminals.

Wellness is a manufacturing and distribution organization which had suffered a loss in profitability and market share. The support system was called for by the new CEO who was attempting to make the company more analysis and marketing oriented. At the end of two years the system had expanded from usage by eight executives to significantly affect the work of product managers and analysts. There are currently two subsystems of the executive support system: one for the marketing organization, and one for the sales organization. Significant changes have occurred in the product mix, organizational structure, incentive system and middle management work along with implementation of the support system. Currently there is concentration on a training program for managers, and reorganization of the database.

Smokestack is a basic manufacturing organization which was suffering large losses and near collapse. The support system was called for by the new chairman who was looking for a system to help him identify areas for cost control. Responsibility for the system was given to the CFO. Over the last two years there have been several attempts at limited executive support, including a personnel system, an acquisition model, a management reporting system, and a price model. Currently the CFO is establishing a budgeting model to be used by the senior five managers in making allocation decisions. During the last two years there has been an improvement in the financial position of the firm, but there have been several reorganizations, personnel changes, and divestitures.

International Products is a consumer products company responsible for the production, marketing, and sales of personal care products. The company has a long-established market share and is a leader in its industry. The support system was called for by the new CEO who was looking for a way to present complex data simply and wanted to identify changes in the firm's markets and bring divisions into line with the group's strategic plan. Responsibility for the ESS was given to the comptroller; initial users were the CEO and the comptroller. After two and a half years the system has moved down to the divisional presidents and is used by the financial staff. The system's range of applications has expanded to include all of the financial and much non financial data. Executive support has also diffused to other groups of the company.

Toy Electric is the research and development group of a consumer electronics company which was undergoing a change in organizational structure. The chairman called for an ESS to be used in adding communication and personal management tools among the 30 vice presidents of the firm. Implementation of the support system was delegated to the M.I.S. department for initial installation which included 15 vice presidents and their secretaries, and utilized various communication applications. The project was doubled in size after the first year. At the end of the second year the pilot project was terminated.

The main body of this paper is organized as a discussion of the five individual key elements. In discussing each element, key issues will be presented and examples showing how the various firms dealt with these issues at different stages of implementation will be given.

The paper will close with a section that integrates the various elements and relates ESS to organizational change.

## BUSINESS PROBLEM

Firms initiate ESS for three reasons: 1) to solve a business problem; 2) to make executives more efficient; or 3) symbolically to signal to the organization that technology should be employed. There is a distinct difference in the development and use of ESS in the firms where it is initiated as a problem solving tool and where it is initiated for other reasons. The problem-solving systems begin small in number of applications and number of users, and then grow. They gradually evolve into planning systems. The efficiency systems begin with a larger number of users and atrophy. At the end of two years only the problem initiated systems survived. Distinction between the two types of systems is the centrality of the support to work.

### Organization Phase

The business problem is most important during the early stage of development of the support system. Two of the systems were established as crisis responses by new CEO's, who were looking to the new technology for an effective solution to dealing with serious problems. At Smokestack, the firm was losing \$250 million a year and the chairman asked for a system which would allow him to control costs. At Wellness, sales had decreased substantially and the CEO wanted a database which would allow him to shift the company to an analytic marketing orientation.

At International, the division head knew that unless the company could come up with a clear strategic plan, and find better ways of communicating financial information, they were headed for hard times. He looked to ESS as a possible way of averting serious problems.

Clear expectations of the system's capabilities and benefits to the firm by the executive sponsor play an important role in its early development and ultimate utility. At Wellness and International, the sponsors defined their problem or organizational vision clearly and manageable so these issues were addressed. In both cases a critical success factors process was used with a small group of top management to clarify goals and specify the type of information executives needed. This process also served to establish a sense of mission within the organization. At Smokestack the function of the support system was initially more ambiguous. The early prototype was focused on cost problems but there was no clear direction because there were several other problems apparent at the same time. It was not until two years and three pilots later when executive support focused around the budgeting process, that the system began to function.

At Manuco and Toy, the ESS was not linked to business problems. Although Manuco had several long-standing business issues caused by its competitive situation, these were not employed as a catalyst for the executive support system. The only expectation set by the Chairman of Manuco was that senior executives should experiment with information technology and thus provide an example for people below them in their organization to use it. At Toy, the President wanted a machine for the 30 vice presidents and their secretaries which would help them communicate and manage their time better. In comparison to the effectiveness systems, the initial expectations of these systems were low, as they supported tasks peripheral to the core needs of the business.

#### Installation Phase

As implementation evolves through and beyond the installation period, the original business problem is not as important as it is in the organizational phase. During the installation phase at Wellness, the support system evolved

to include more applications and receive use from lower levels in the organization. The focus of the system moved from present problems to planning of future products, and a component for the sales organization was added. At International, several financial, competitive, and non-financial databases were added to the initial support system and the executives of the divisions were put on the system.

Initially executives use the support system to retrieve the management reports that they used to receive in hard copy. As the support systems evolve and their staffs develop competence in the use of decision support tools, the systems are increasingly used for "what if" queries and scenario building.

At Smokestack, the evolutionary design took the form of trial and error. Since the initial goals of the ESS were ambiguous, there were a series of support systems developed for various executives, including an executive personnel system, a pricing model, a management reporting system and a plastics division model. None of these systems was totally successful and they reflected the ambiguity of the chairman in his initial call for executive support. They did, however, serve to expose senior executives to some of the possibilities of information technology.

The approach to ESS at Manuco and Toy during the installation phase could be termed the "portfolio approach". The Information Systems (IS) departments provided a range of applications such as electronic mail, calendaring, word processing, spreadsheets, automatic dialing, and corporate reports. The rationale was that with a wide choice of applications the executives would find something useful. At both firms, a significant number of executives utilized electronic mail, though a lack of people on the mail system at Toy made the its use limited. Over time the usage of the communications tools diminished and only a small number of people used them.

The difficulty of implementing the efficiency systems can be attributed to the fact that senior executives have satisfactory support in the form of executive secretaries and assistants, and subordinates respond to their demands quickly. This differs from the business problem based systems where the information provided value added about a core concern of the business.

### Institutionalization Phase

During the institutionalization phase, the "raison d'etre" for ESS shifts from a business crisis to a combination of monitoring business health and looking toward the future.

At International, the President has used the ESS in assessing new ventures as a way of avoiding the decline of old products. At Wellness, the ESS is being used to make decisions about new product development.

Another aspect of executive support in the institutionalization period is its linkage to core organizational processes. At Smokestack, it is utilized in the budgeting process, at International in strategic planning, and at Wellness in marketing and sales. It is interesting to note that those ESS which were not institutionalized were not linked to any core business function.

## SPONSORSHIP

Sponsorship is the initiative role played by the senior executive in the design, development, and use of support systems. The executive's participation makes more of a mark on the implementation of ESS than on any other element in the initiation and execution of executive support. The sponsor's functions include:

- o initiating the demand for ESS,
- o establishing an organization to implement it,
- o defining its purpose,
- o evolving its usage,
- o utilizing its outputs, and
- o moving it through the organization.

In the firms we have researched and worked with there have been a variety of patterns of sponsorship that include executives who view ESS as an essential management tool and those who see ESS as peripheral. There are executives who participate in the design, development, and evolution of the system, while others delegate it to the IS department. There are those who define the purpose of the system very early, while others discover its utility during implementation. The sponsorship role changes during the life of the support system. Initially the titular sponsor, that executive who called for the system, is most important. As time moves on, an "operating sponsor", the person delegated to manage the installation and diffusion of the system, becomes most important.

### Organizational Phase

The titular sponsor's motivation to call for ESS is spawned by two situations: 1) the combination of a crisis (s)he wants to solve and being new to the job, or 2) a desire to have executives utilize computer technology as part of their daily work. The titular sponsors in this study divided into two categories. Those who called for effectiveness systems were all new to their jobs, looking for information to aid them in the solution of some problem, to provide a fast understanding of how the organization functioned, and to bring about organizational change. The sponsors who called for efficiency systems had been in their jobs longer and were motivated by a generalized desire to have other senior executives demonstrate modernity and work more efficiently by using technology.

After saying "I want one", the next step was defining what "it" was. At this stage there were a variety of responses by the sponsors. At Wellness, there was a problem-solution support system match. The CEO and his top managers went through a critical success factors process and defined the information needed to analyze their markets, assess performance of their products, and link the two to their sales territories. This exercise articulated a clear vision of where the management team was heading in aiming at high profit margin items. At Smokestack, the chairman and the head of decision support utilized a similar problem-solution match to develop a prototype system for cost control but no other executives were involved. At International, the "discover as you implement" approach was used in defining the system. The comptroller, who had been developing accounts receivable and forecasting applications and the new CEO who was trying to find a way to easily communicate financial information requested that a computer graphics system be linked with the database.

At Manuco and Toy, the CEOs defined the support systems through delegation. At Manuco, the chairman stated that he wanted every group executive to have a computer on his desk, symbolizing to the rest of the organization that senior management was using technology, so they should. He then delegated sponsorship of the project to the IS organization. At Toy, the president asked an engineering group and then the MIS group to find a communications tool for senior executives which would combine a telephone and computer tools to help them with their management. In both cases the titular sponsor saw the support system as technical support and delegated its definition to technical organizations. This was in sharp contrast to the other three firms where the titular sponsors saw the systems as management tools and involved themselves and other executives in defining the systems.

#### Installation Phase

The role of sponsorship shifts from the titular sponsor to the operating sponsor as the task changes from envisioning the support system to installing it and evolving its usage within the organization.

The role of operating sponsorship is best demonstrated by its absence. At Smokestack, the chairman delegated installation of the project to the CFO who resigned, then to another vice president who was uninterested in the system. During this 15 month hiatus, the computing group initiated a series of less than successful support systems for division heads, and various vice presidents. A new CFO was then appointed who implemented a management reporting system for the group vice presidents that had been stalled by his predecessor, and then the computing group, under the auspices of the CFO, developed a model to be used by all groups in the budget process. This model allowed the chairman and CFO to look at the relationships of the various groups as a value added chain, something they had previously been unable to

do. This budgeting model is becoming the ESS as it allows the senior management to look at individual businesses and their relationship to each other, which is the current central problem of the firm.

The comptroller at International represents a good example of operating sponsorship. He acted as the gatekeeper between the computing group and the president, made decisions regarding application development, linked the support system to the strategic planning process, and executed all of the applications so they were useable by other executives. As his primary contribution, the comptroller directed the financial analysts in learning to develop and utilize the ESS. He was also instrumental in diffusing ESS usage downward, into the various divisions of the group.

Sophisticated knowledge of computer technology was not a necessary condition to effective usage of the support system by senior executives. The ESS were very easy to use, with such features as menus, touchtone screens, and fourth-generation languages. During the installation phase, the executives we observed learned to utilize the technology, usually beginning with retrieval of the standard reports they previously had received in hardcover. When more demanding tasks, such as querying and modeling, were demanded the executive had the system chauffeur driven by one of his staff. The CEOs at Wellness and International both stated that ESS gave them an understanding of the dynamics of their businesses they had never had prior to the system's installation.

### Institutionalization Phase

During the institutionalization phase of ESS, the sponsors became more users of the system's output and less directors of its development. By demanding a coherent set of information within an easily accessible, defined framework, these sponsors had driven the organizations under them to hire and train managers with computer skills who spent a significant part of their time

inputting the system. At both Wellness and International, line managers and staff analysts adapted their work to the support system.

During the institutionalization period there are two processes which occur: 1) the ESS is diffused to other parts of the organization where new sponsors must adapt them to their needs, and 2) middle management is affected by having to fit analyses and reports into the framework of the support system in answering requests of their superiors.

The importance of new sponsorship can be seen at International. The MIS group disseminated the tools developed in the original division to another group. The group executive did not perceive the financial management tools as linked to his job, so what had been an ESS, became a middle management efficiency tool, helping the financial analysts in the new group to get their work done faster. At Wellness, and in the original group at International, the division heads and middle managers were highly affected by the ESS. The ESS imposed a discipline on the type of questions asked by senior executives of their subordinates, which in turn demanded that middle managers utilize computer-based skills and begin thinking in the framework of the ESS. In the three firms where problem-oriented ESS were established, the middle managers perceived their advancement as being linked to their ability to utilize decisions support tools.

ESS is an end-user computing tool. The sponsor plays the key role in defining the use of the ESS so that it is used as a management tool. There were two patterns of sponsorship that delineated whether the ESS was ultimately useful as a management tool. One group of sponsors, exemplified by either the titular or operating sponsor in the effectiveness groups, saw the ESS as an extension of themselves and participated actively in its design and the establishment of an organization to implement and manage it. Systems

implemented under these sponsors reached full implementation. The other group delegated the design of the system to others, giving the message that they saw ESS as technical support rather than as a management tool.

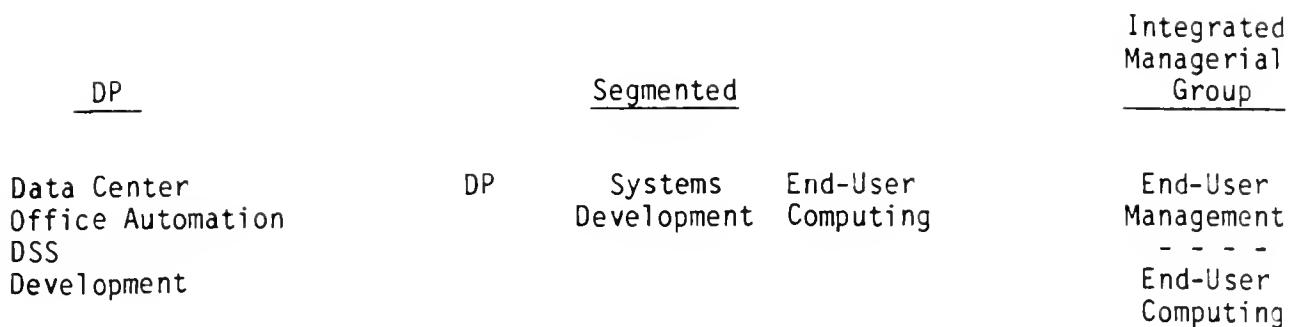
There are two constructs that should be considered in understanding sponsorship. The first is that business crises or visions create effective sponsorship, and the second is that some executives, the co-opters, view the technology as a valuable phenomena that must be turned to their advantage, while others, the victims, do not understand it and therefore manage it by delegating it to technical groups, and do not involve themselves in the process of implementation.

The role of computing groups is central to Executive Support Systems throughout the life cycle of implementation. The structure of the group, its relationship to management, and the approaches it uses in developing the support system at different stages of evolution significantly impact the effectiveness of the support system. ESS presents MIS with the extremes of the problems and opportunities associated with end user computing. The perceived power differential between general managers and MIS staff, combined with the differences in the nature of managerial and technical work, affect the process of defining and implementing easy to use, but complex, support systems.

In the various approaches that the MIS or management take, there are three key factors to be controlled which affect implementation: (1) problem definition, (2) the type of ESS presented as the solution to the problem, and (3) the organizational sponsorship of the ESS. When all three factors are addressed, as in the case of management generated support systems to solve a defined problem, the implementation process will move most effectively to meet expectations. When these expectations are not well defined, the ESS has less likelihood of being effective.

There are three types of IS organizations associated with ESS: the data processing (DP) group, the segmented group, and the integrated group, as shown in Figure 2.

Figure 2  
Organization of MIS Groups



The DP group differs little from the groups that constructed transaction processing systems a decade ago, but they have since absorbed new technologies, including office automation and decision support. The DP groups approached ESS as a traditional systems development effort. The DP groups were staffed by people with strong technical backgrounds and had a product orientation. They took full delegated control of the projects rather than sharing decision making with management, and placed major emphasis on the development of hardware. The DP groups concentrated their effort more on the early phases of the project rather than on the installation phase of ESS.

In the segmented MIS organization, the end-user computing function is autonomous, data processing is handled by one group, systems development by a second, and user-controlled technologies by a third.

An end-user computing group differs from a traditional DP group in several respects:

1) They are service rather than product oriented. Their role is to help the end user accomplish his aims and establish the most appropriate hardware and software environments in which to do this. They do not "control" the system. From the outset it is clear that decisions concerning use of the system come from the end user. In two of our cases it was decided prior to beginning work that the system would be turnkeyed to the end user.

2) End-user computing groups are staffed by people with a business background, or project teams are set up to include end-user management.

3) End-user groups use an evolutionary design process which starts with a prototype and adds applications incrementally, as opposed to the traditional DP process of fully developing the system before usage.

The integrated MIS groups report directly to management as members of the executive's staff and have only a "dotted-line" relationship to the MIS organization. None of the groups we studied started as integrated groups, but evolved that way as the ESS implementation progressed. The staff within the integrated group is more managerial than technical in background and demonstrates consulting skills. However, they have a strong background in computer tools. They view information technology as the tool to accomplish a primary business task, such as financial planning or marketing.

The differences and similarities between the groups can be seen in their definition of and approaches to implementing ESS at different stages of development.

#### Organization Phase

The main task in the early stages of ESS is defining the problem to be worked with and choosing appropriate hardware and software. At Wellness, the end-user computing group interviewed several subsidiary presidents to find a situation where an ESS would meet a need. They found a subsidiary where the new CEO was looking for a tool to change the focus of the company from sales to marketing. They conducted critical success factor interviews among the four senior executives to determine what information was needed and then developed a prototype of the marketing support system. At this point, Wellness committed the funding for the project and the Wellness management, jointly with the end-user computing group, chose Express as the language for the ESS. A member of the end-user computing staff was assigned at Wellness.

In contrast to Wellness, at Manuco executive support was given to an engineering group within the management systems organization which then developed technical specifications for personal computers to be used by executives. The project was then given to a newly formed marketing group within the information systems group which developed applications for an executive workstation. After the hardware had been ordered, the marketing group interviewed the eighteen executives and their secretaries who were designated as users. Unfortunately, they found out in the interviews that the hardware did not meet the work requirements of the executives.

The main differences between the approaches of the DP groups and the end-user organizations are that: 1) DP groups emphasized hardware, where the end-user organizations concentrated on problem definition and software, and 2) the DP groups were delegated or took control of the project, where the end-user groups shared decision making on the nature of the support system with line management.

#### Installation Phase

In the installation stage, the task of the computing groups is to get the system functioning and work through startup problems, modifying the system so it is of real utility to the users.

International presents a typical example of where an end-user computing group worked on a parity basis with the International management, supplying half the manpower to teams developing different applications. After developing a prototype of a financial database with a financial analyst, the computing staff then went on to develop a non-financial database, an accounts receivable package, and a competitive database. They also helped select a graphics package but their choice for graphics was not the one finally chosen

by International's management. The computing group at International combined a strategy of evolutionary design with participative decision making by the management group.

In contrast to International, the computing groups at Manuco and Toy were delegated more responsibility, but had less authority over the installation of the ESS. To cope with the ambiguity, the groups utilized a portfolio approach to the project. At Manuco, the MIS group decided that executives and their secretaries would utilize the following tools; word processing, calendaring, electronic mail, document transfer, Dow Jones, corporate reports, and spread sheets. They placed all these applications on very easy-to-use menus and provided individual training to all the executives and secretaries involved. Their rationale was that out of the sumptuous buffet of software the executives would chose something. Although secretaries did utilize the system, only four executives used it regularly and the computing group was unable to get access to the executives to train them, or to divisional data, which might be of assistance to the executives. Another aspect of the DP group's approach was an emphasis on the computer interface. At Toy, the hardware, which was a combination of telephone and computer, took only an hour to learn to use, and at Manuco considerable effort was placed on establishing one-button access to any application faced with low usage. As a solution, the computing groups continued to expand the portfolio and the number of installations.

With both the end user and DP groups, emphasis was placed on user training during the installation phase. At International and Wellness, the computing group saw its function as developing expertise within the executive staff, and at Manuco and Toy the emphasis was placed on user seductive software which could be of immediate utility to the executive. At Smokestack, effort was

made to provide executives with easy-to-use management reports. The training efforts were more successful when aimed at staff people than at the executives themselves.

#### Institutionalization Phase

During the institutionalization phase of implementation, the tasks for the computing groups are to disseminate the system either downward and diffuse within the organization or across other divisions, and to establish a standardized environment for operation of the system.

The efficiency oriented communication systems ceased to exist after the installation phase. At Manuco and Toy the support systems had been labeled as pilots, and both firms declared victory and ceased operation. At the other three firms the support systems became embedded within the organization.

In all three firms the computing groups moved toward being more integrated into the user organization. At Smokestack, the computing group moved from de facto reporting to MIS, to reporting to the CFO. At International, the comptroller's staff took over operation of the support system and the computing group disseminated the applications to four other divisions. At Wellness, the computing organization lost its reporting independence from MIS, but became fully integrated within subsidiary management. At both Wellness and International, the support system affected the jobs of middle managers and analysts within the organization, and training programs were established to provide these managers with the necessary skills in use and growth of the technology. At Wellness, the increase in breadth and depth of the system necessitated a reconstruction of the data base which was given to the computing group.

At Smokestack, the integration occurred around a central corporation-wide process budgeting. The computing group, as delegate for the CFO, developed a budgeting model which affected all groups in the corporation. They are currently in the process of training the various financial staffs in use of the tool.

In summary, the computing group is an important factor in executive support since they affect the implementation at all stages, and have considerable daily contact with the nuts and bolts of the system. The role of the computing groups changes during the process of implementation from problem definer, to implementor, to maintainer and diffuser of systems. The computing groups which were most successful appear to have shared decision making more with management than those who were delegated more responsibility for the implementation.

The discussion of computing groups as a factor illustrates the problem of separating out factors. It is obvious that the kind of management sponsorship and problem definition greatly affect the role of the computing group. It is not coincidence that computing groups were more effective when business problems catalyzed initiation of the system, and managerial sponsorship was active. However, the ability of computing groups to capitalize on those opportunities depends on their structure and skills.

## DATABASES AND NETWORKS

The existence, usability, and development of databases were major factors in the building of ESS. Existing databases were a necessary but not sufficient condition for the installation stage of the effectiveness-oriented systems and became important again in the institutionalization phase. The pre-existence of a community of users is as necessary a condition for communication-oriented support systems as databases are for business problem-based systems since being accustomed to the technology speeds the implementation process. The existence of databases and a community of users demonstrates a seeding of technology within the firm that prepares it for the growth of support systems. During the last phase of implementation, databases become important as diffusion of ESS from one division to others and to the corporate office demands the creation of a data warehouse and the establishment of common conventions surrounding data management.

### Organizational and Installation Phase

Business problem-based ESS demand the presence of information on which alternative scenarios for decisions can be made against past performance, and categories of information may be compared to each other. In two of the firms we studied, Wellness and International, the use of information technology was well developed. This indicated that managers had been exposed to information technology and that historical databases on matters central to the firm were usable. In contrast, information systems had been given very low priority at Smokestack prior to the arrival of the new management. At the beginning of the implementation process, the computing group found that all financial

accounting had been decentralized to the subsidiaries, rendering financial data incomparable. The centralization of accounting practices and the development of a common general ledger system was necessary before financial data could be developed for an ESS. The development of these systems took 18 months and made the initial concept of a cost control ESS unfeasible. Smokestack was able to establish a management reporting system and then a budget model only after the data requirements between divisions had been standardized and the consolidated reporting system needed for the database was established.

In the communication-oriented ESSs, the executives need the people they communicate with linked to them on the system. If the people in the executive's communication community do not use or are not on the system, then the executive cannot gain the benefits of using such efficiency-oriented communication tools as electronic mail. At both Manuco and Toy, it was found that executives communicated downward to their subordinates. In both firms, the support systems were organized horizontally to other executives and subordinates were not originally on the system. This limited the utility that the systems could have.

Manuco provides a good example of what occurs when databases cannot be compared or utilized across different groups. The firm had over fifty separate divisional and staff databases but the databases could not be used in concert. This caused considerable difficulty for the policy-oriented group executives who complained that the ESS could only be of help to them in their work if they could utilize and compare information across divisions and groups. This example illustrates why three of the firms spent considerable time and effort in selecting database management systems that created relational databases.

### Institutionalization Phase

The databases for ESS are often, though not exclusively, extracts of corporate transaction systems. During the institutionalization period, ESS diffuses into other divisions and staffs, and usage within corporate subgroups increases. It is necessary to establish corporation-wide systems that allow for easy transfer of data. The two firms we have studied that have reached the institutionalization stage have approached the problem of standardization by establishing corporate data warehouses from which data can be extracted for individual support systems and establishing common database management systems which all divisions and subsidiaries must use.

## THE MANAGEMENT OF RESISTANCE

Resistance to a new technology is a normal phenomenon. Resistance can be either an act to protect one's domain or simply "why should one change unless the new way is better?" Resistance to ESS occurred during the installation period in all companies. It took the form of nonusage of the system, active resistance, and withholding. Resistance can slow down or cripple installation of an ESS. Where the ESS's were installed well, resistance was effectively managed.

### Installation Phase

In efficiency-based systems, the resistance took the form of nonusage of the system. Toy Electric provided a good example of this passive resistance. The executives already had good support in place; secretaries to pass and screen their messages, administrative assistants to do budgets. The resistance was expressed by both secretaries and executives. In responding to questionnaires, they said the system was fine, and asked for minor modifications, but they didn't use the system, because the questionnaires addressed interface rather than compatibility of work issues. In this way they satisfied the perceived desire of the CEO to provide a personal management tool, and then proceeded to work as they liked. At Wellness, the problem of nonusage was dealt with by the president inviting other executives to attend training sessions with him.

Active resistance was evident at Smokestack. The DSS group developed an easy-to-use personnel query system for the Vice President of personnel. He used the system for 3 weeks and then gave it to his own systems person to operate. The systems person claimed that the new system was inadequate and not as complete as the complex personnel information system already in

existence. He was, however, the only one in the corporation who could operate the older system, where the new, simpler system was usable by anyone.

A third form of resistance, withholding, is based on the "information is power" principle. At Manuco, the MIS people were unable to obtain several divisional databases which would have been helpful to group executives in policy planning because the divisions did not want their data on a common system.

At International, the divisional presidents were reluctant to provide information for the ESS because they thought their autonomy would be affected. A frank discussion around critical success factors was held between the divisional executive and group president, allowing resistance to be dealt with by negotiation. This is a good example of how resistance can be dealt with. Because participation in designing the system was high, end users perceived it as a central tool to their success rather than an infringement on their autonomy and resistance was dealt with.

## PUTTING THE PIECES TOGETHER

Figure 3 shows definite patterns in the relationship between the number of elements that are managed well during the implementation process and the effectiveness of the ESS. Wellness and International had all the elements present early and promptly and have the most successful implementations to date. Manuco and Toy had fewest elements present, the most problems, and ceased the implementation process prior to institutionalization. The primary messages that come out of the chart are that business-oriented systems function better than efficiency-oriented systems and that the greater the number of elements present, the more likely the support system is to meet the executive's needs. This is exemplified in the case of Smokestack where the initial absence of operating sponsorship and databases significantly retarded development of the implementation.

Figure 3

	<u>Toy</u>	<u>Manuco</u>	<u>Wellness</u>	<u>Smokestack</u>	<u>International</u>
Defined Business Problem			0	0*	0
Titular Sponsorship	0	0	0	0	0
Operating Sponsorship			0	0*	0
End-User Organization		0	0	0	0
Database			0		0
Management of Resistance			0	0*	0

\* late

## ESS AND ORGANIZATIONAL CHANGE

ESS is often a lever for organizational change. This change tends to be associated with a new leader's vision of how he wants his organization to function. The ESS becomes an extension of the leader. It is one of the tools he uses in bringing about a restructuring of the organizational mission. The reports and data in the E.S.S. are the message to the rest of the organization of what indicators count, and the staff who manage the E.S.S. become the gatekeepers of information.

The relationship of executive support and organizational change was clear in this sample. The three executives who sponsored effectiveness oriented systems had been in their jobs less than a year. They all said that after spending several months getting accustomed to their jobs they developed a vision of where they wanted to move the organization. At International, Peter Dewey saw a need to focus the corporation on its future. This meant finding ways to communicate critical information to the top of the organization and to bring the divisions in his group into line with a strategic plan. Dewey perceived the firm as complacent due to past success, and unrealistic about its future. He also felt that the changes had to be brought about carefully, since there was a long history of decentralization of the subsidiaries and no immediate crisis to justify participants' action. He was also conscious that as a group executive he had limited staff and it was not fruitful to involve himself in the nitty gritty operations of his divisions. He saw his increase in effectiveness in being able to make his divisions, and the upper management of the corporation focus on strategic planning. For Dewey the presentation form of information became very important. He felt that graphics allowed people to see trends clearly and avoided being buried in numbers and paper.

This fit his role perception of communicating crucial information and goals upward to the chairman and down to his divisions. He also utilized the CSF process in bringing his division presidents into agreement with the strategic plan and established a graphic reporting system linked to that plan. Dewey's vision was one which he saw as gradually moving international to its future rather than reacting to crisis. At this point the divisions have institutionalized reporting which addresses the strategic goals.

When Paul Dawson assumed the helm at Wellness he knew that the traditional sales orientation was not working any more. Dawson had a vision of changing Wellness into a firm that was analytically marketing based. Dawson established his ESS with a marketing database and simultaneously established a market research group directly below him to run the system. He changed the bonus structure for his managers from one where they got bonuses by meeting quota on any products to one where they had to meet quota on all product lines. In the last year Dawson has restructured the division, amalgamating units and dropping product lines, forcing them to use the system. He has also focused his sales effort on a different market segment. In Dawson's case the ESS can be seen as one of the tools in a tool kit for changing the operation and culture of Wellness.

It is worth noting that a significant difference between the ESS systems which are business problem based and linked to visions of change, and the systems which are oriented to personal management and efficiency is that the communications-based systems are not driven by a vision of organizational change. This may make them more difficult to implement because the executive is actually viewing the system as office equipment, a typewriter or dictaphone, rather than as a central part of his business.

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